

1823; 18th, in 1786; 19th, in 1804 and 1873; 20th, in 1806, and 22nd 1797 and 1875; in 6 previous years—1792, 1798, 1809, 1825, 1835 and 1855, it has closed on the same date, the 23rd. *Lake Superior*.—Duluth, 15th, ice forming rapidly; 24th, ice broken up by storm; 25th, commenced to go out and lodge along north shore; 28th end of lake full of ice; 29th, lake filled with thin ice as far as can be seen. Ashland, Wis., Long Island Bay closed by ice on the 16th. Marquette, Mich., 13th, navigation closed. *Geneva Lake*.—Bloomfield, Wis., 23rd, frozen over. *Wolf River*.—Near Embarrass, Wis., 23d, frozen over. *Lake Michigan*.—Escanaba, 25th, bay frozen over; 29th, navigation practically closed. The sudden and unexpected closing of navigation laid up 21 vessels at this port, 12 of which were loaded. Chicago, 21st, lake frozen; 26th, many vessels reported ice-bound at different ports along the lake; 30th, navigation generally closed. *Grand River*.—Lausing, Mich., 19th, closed by ice. Grand Haven, Mich., 21st, river closed by ice. *Lake Huron*.—Alpena, Mich., 22nd, Thunder Bay river frozen over; Thunder Bay full of ice as far as can be seen; 12 or 15 boats frozen in; 24th, steamer arrived from Detroit with great difficulty; 28th, bay partly clear. Port Huron, Mich., 20th, Black river frozen over solid, "the harbor crowded with vessels waiting an opportunity to break through St. Clair Flats which are reported frozen over"; 23rd, vessels going into winter quarters. *Detroit River*.—Detroit, 19th to 21st, ice in river; 22nd, navigation suspended; 26th, navigation resumed. *Lake Erie*.—Toledo, 17th, ice in river; 28th, frozen over, ice 2 inches thick; 22nd, 6 inches thick; 24th, navigation closed. Sandusky, Ohio, 19th, ice 2 inches thick formed over greater part of bay; steamers going into winter quarters; 20th, bay frozen entirely across; 27th, twenty-four large propellers, grain-laden, ice bound near Point au Pelee island. Erie, Pa., 22nd, bay frozen over. *Lake Ontario*.—Oswego, N. Y., 22nd, canal closed by ice. *Schroon Lake*, N. Y., 28th, frozen over. *Lake Champlain*.—Burlington, Vt., 24th, Winooski river and upper part of lake frozen over.

CANALS.—*Miami*.—Cincinnati, Ohio, 19th, closed; 22nd, frozen over; 27th, ice 5 inches thick. *Erie*.—Rochester, N. Y., 19th, canal and Genessee river frozen over; 22nd, navigation in canal closed—700 boats frozen in between Buffalo and Syracuse. *Pennsylvania*.—*West branch*.—Milton, Pa., 22nd, frozen over; *North branch*.—Catawissa, Pa., 22nd, closed by ice. *Lehigh, Delaware and Morris*.—Easton, Pa., 24th, frozen up—navigation entirely ceased—100 boats frozen up at Port Delaware; the Lehigh canal, from Easton to Mauch Chunk, lined with loaded canal boats fast in the ice—"such a cold spell at this season has not been known for a great many years." Dyberry, Pa., 22nd, canal navigation closed. *Delaware and Hudson River*.—Port Jervis, N. Y., 1st, navigation resumed after having been closed for want of water since September 22nd.

TEMPERATURE OF WATER.

The temperature of water, as observed in rivers and harbors at Signal Service Stations, with the average depth at which observations were taken, is given in the table on the left hand side of chart No. II. Owing to the breaking of the thermometer, ice etc., observations are wanting, as follows: Alpena, from the 17th; Augusta, 11th to 15th; Chicago, from the 21st; Duluth, from the 28th; Detroit, from the 19th; Escanaba, from the 25th; Grand Haven, from the 21st; Marquette, 22nd, 29th and 30th; Mobile, from 1st to 23rd inclusive; Norfolk, from the 26th; Sandusky from the 21st; Toledo, from the 13th.

ATMOSPHERIC ELECTRICITY.

Thunder Storms have been comparatively rare, except in the Gulf States. Storms were reported from more than one station in that district on the 4th, 5th, 8th to 10th, 12th, 16th, 19th and 30th.

Zodiacal Light.—*Indiana*: New Corydon, 1st-3rd, 7th-9th, 12th, 14th, 15th, 21st-23rd, 25th-27th, 29th, 30th. *Iowa*: Monticello, 8th, 22nd, 29th. *Kansas*: Yates Centre, 21st, 22nd, 26th, 30th. Lawrence, looked for, none seen. *Minnesota*: St. Vincent, 14th and 30th. *Massachusetts*: Cambridge, (Harvard University,) 22nd, 23rd, 27th, 29th, 30th; Somerset, 29th. *Ohio*: Bellefontaine, 20th, 22nd, 23rd. *Missouri*: Oregon, 4th, 20th-22nd, 28th, 29th. *Nebraska*: Clear Creek, 26th, 28th.

Auroras.—On the 1st, the aurora was visible in Maine, Vermont and at Bismarck, Dak. On the 2nd and 3rd, it was observed generally in New England, New York and New Jersey. The most southerly station reporting it on the former date, was Somerville, N. J., and on the latter date, Moorestown, N. J. It was also observed, on the 2nd, at St. Vincent, Minn., and on the 3d, at Dayton, Wash. Ter. On the 21st, a display was observed at Newport, R. I., Wellsboro', Pa., and Lansing, Mich. On the 30th, a display was general in the northern part of New England; the most southerly station reporting, was Somerset, Mass.; it was noted the same day at Oswego, Port Huron and Breckenridge. Isolated displays are reported from New England under dates of the 4th, 6th to 10th, inclusive, from Pennsylvania on the 23rd and 26th, from Iowa on the 14th, 25th and 29th, Dakota on the 9th, from Minnesota on the 20th, 23rd, 27th and 29th, and from Nebraska on the 28th, from Indiana on the 20th, from Michigan on the 22nd. Lack of space forbids a description of these auroras, none of which appear from their descriptions, to have been unusually bright.

OPTICAL PHENOMENA

Solar Halos.—Guttenburg, Ia., 25th, 10 a. m., to 1 p. m., brilliant halo with five mock suns, two green and yellow and three white. Clinton, Ia., 17th, double halo in afternoon.

Lunar Halos.—Clinton, Ia., 17th, large double halo with two mock moons.